

For Reference

NOT TO BE TAKEN FROM THIS ROOM

Ex LIBRIS
UNIVERSITATIS
ALBERTAENSIS



PERCEPTUAL DEFENCE, SYMPATHETIC REACTIVITY, AND
PERSONALITY

by

Paul Iyorpuu Unongo



A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF SCIENCE

DEPARTMENT OF PSYCHOLOGY
THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
DECEMBER, 1967

ABSTRACT

The purpose of this study was to examine the combined effects of different levels of stimulus aggressiveness and personality traits on Ss' rapidity of performance in a tachistoscopic recognition situation.

The four major groups of Ss employed: stable extraverts (SE), neurotic extraverts (NE), stable introverts (SI), and neurotic introverts (NI) were defined on the basis of their scores on the MPI (Eysenck, 1959). All Ss were tachistoscopically presented with 20 stimulus words of varying degrees of aggressiveness (Buss, 1961) controlled for structure and frequency (Thorndike-Lorge Word Count, 1944) and their recognition thresholds and GSR responses measured.

It was found, as suggested, that low neurotics (LN) and NE gave higher recognition thresholds with low aggression (LA) words than with high aggression (HA) words, and NI gave the reverse, i.e. they recognized the HA words faster than LA words. The hypotheses suggesting that extraverts are innately less sensitive to stimulation than introverts were not supported. Introverts tended to give both higher GSRs and higher recognition thresholds than extraverts. The results were discussed with reference to Eysenck (1957; 1965; 1966), McDougall (1927; Ginsburg, 1966; 1967), and Callaway and Thompson (1953).

ACKNOWLEDGEMENTS

I am particularly grateful to Dr. T. E. Weckowicz, thesis supervisor, who was kind enough to accept me as his student and to guide this project through its many stages. Thanks are also due to Dr. T. M. Nelson and Dr. B. G. Rule, the other members of my committee, for their helpful suggestions and assistance.

The Department of Psychiatry, University Hospital sponsored this research and provided a Graduate Research Assistantship to me. I am grateful to Dr. K. A. Yonge, Director of Psychiatry, for the facilities made available to me. Finally, I would like to thank all those nurses and other volunteers at the hospital who cooperated in this research, and Miss Karen G. Grier for her typing hours.

APPENDIX 1	15
APPENDIX 2	17
APPENDIX 3	19
APPENDIX 4	21
APPENDIX 5	23
APPENDIX 6	25
APPENDIX 7	27
APPENDIX 8	29
APPENDIX 9	31
APPENDIX 10	33
APPENDIX 11	35
APPENDIX 12	37
APPENDIX 13	39
APPENDIX 14	41
APPENDIX 15	43
APPENDIX 16	45
APPENDIX 17	47
APPENDIX 18	49
APPENDIX 19	51
APPENDIX 20	53
APPENDIX 21	55
APPENDIX 22	57
APPENDIX 23	59
APPENDIX 24	61
APPENDIX 25	63
APPENDIX 26	65
APPENDIX 27	67
APPENDIX 28	69
APPENDIX 29	71
APPENDIX 30	73
APPENDIX 31	75
APPENDIX 32	77
APPENDIX 33	79
APPENDIX 34	81
APPENDIX 35	83
APPENDIX 36	85
APPENDIX 37	87
APPENDIX 38	89
APPENDIX 39	91
APPENDIX 40	93
APPENDIX 41	95
APPENDIX 42	97
APPENDIX 43	99
APPENDIX 44	101
APPENDIX 45	103
APPENDIX 46	105
APPENDIX 47	107
APPENDIX 48	109
APPENDIX 49	111
APPENDIX 50	113
APPENDIX 51	115
APPENDIX 52	117
APPENDIX 53	119
APPENDIX 54	121
APPENDIX 55	123
APPENDIX 56	125
APPENDIX 57	127
APPENDIX 58	129
APPENDIX 59	131
APPENDIX 60	133
APPENDIX 61	135
APPENDIX 62	137
APPENDIX 63	139
APPENDIX 64	141
APPENDIX 65	143
APPENDIX 66	145
APPENDIX 67	147
APPENDIX 68	149
APPENDIX 69	151
APPENDIX 70	153
APPENDIX 71	155
APPENDIX 72	157
APPENDIX 73	159
APPENDIX 74	161
APPENDIX 75	163
APPENDIX 76	165
APPENDIX 77	167
APPENDIX 78	169
APPENDIX 79	171
APPENDIX 80	173
APPENDIX 81	175
APPENDIX 82	177
APPENDIX 83	179
APPENDIX 84	181
APPENDIX 85	183
APPENDIX 86	185
APPENDIX 87	187
APPENDIX 88	189
APPENDIX 89	191
APPENDIX 90	193
APPENDIX 91	195
APPENDIX 92	197
APPENDIX 93	199
APPENDIX 94	201
APPENDIX 95	203
APPENDIX 96	205
APPENDIX 97	207
APPENDIX 98	209
APPENDIX 99	211
APPENDIX 100	213
APPENDIX 101	215
APPENDIX 102	217
APPENDIX 103	219
APPENDIX 104	221
APPENDIX 105	223
APPENDIX 106	225
APPENDIX 107	227
APPENDIX 108	229
APPENDIX 109	231
APPENDIX 110	233
APPENDIX 111	235
APPENDIX 112	237
APPENDIX 113	239
APPENDIX 114	241
APPENDIX 115	243
APPENDIX 116	245
APPENDIX 117	247
APPENDIX 118	249
APPENDIX 119	251
APPENDIX 120	253
APPENDIX 121	255
APPENDIX 122	257
APPENDIX 123	259
APPENDIX 124	261
APPENDIX 125	263
APPENDIX 126	265
APPENDIX 127	267
APPENDIX 128	269
APPENDIX 129	271
APPENDIX 130	273
APPENDIX 131	275
APPENDIX 132	277
APPENDIX 133	279
APPENDIX 134	281
APPENDIX 135	283
APPENDIX 136	285
APPENDIX 137	287
APPENDIX 138	289
APPENDIX 139	291
APPENDIX 140	293
APPENDIX 141	295
APPENDIX 142	297
APPENDIX 143	299
APPENDIX 144	301
APPENDIX 145	303
APPENDIX 146	305
APPENDIX 147	307
APPENDIX 148	309
APPENDIX 149	311
APPENDIX 150	313
APPENDIX 151	315
APPENDIX 152	317
APPENDIX 153	319
APPENDIX 154	321
APPENDIX 155	323
APPENDIX 156	325
APPENDIX 157	327
APPENDIX 158	329
APPENDIX 159	331
APPENDIX 160	333
APPENDIX 161	335
APPENDIX 162	337
APPENDIX 163	339
APPENDIX 164	341
APPENDIX 165	343
APPENDIX 166	345
APPENDIX 167	347
APPENDIX 168	349
APPENDIX 169	351
APPENDIX 170	353
APPENDIX 171	355
APPENDIX 172	357
APPENDIX 173	359
APPENDIX 174	361
APPENDIX 175	363
APPENDIX 176	365
APPENDIX 177	367
APPENDIX 178	369
APPENDIX 179	371
APPENDIX 180	373
APPENDIX 181	375
APPENDIX 182	377
APPENDIX 183	379
APPENDIX 184	381
APPENDIX 185	383
APPENDIX 186	385
APPENDIX 187	387
APPENDIX 188	389
APPENDIX 189	391
APPENDIX 190	393
APPENDIX 191	395
APPENDIX 192	397
APPENDIX 193	399
APPENDIX 194	401
APPENDIX 195	403
APPENDIX 196	405
APPENDIX 197	407
APPENDIX 198	409
APPENDIX 199	411
APPENDIX 200	413
APPENDIX 201	415
APPENDIX 202	417
APPENDIX 203	419
APPENDIX 204	421
APPENDIX 205	423
APPENDIX 206	425
APPENDIX 207	427
APPENDIX 208	429
APPENDIX 209	431
APPENDIX 210	433
APPENDIX 211	435
APPENDIX 212	437
APPENDIX 213	439
APPENDIX 214	441
APPENDIX 215	443
APPENDIX 216	445
APPENDIX 217	447
APPENDIX 218	449
APPENDIX 219	451
APPENDIX 220	453
APPENDIX 221	455
APPENDIX 222	457
APPENDIX 223	459
APPENDIX 224	461
APPENDIX 225	463
APPENDIX 226	465
APPENDIX 227	467
APPENDIX 228	469
APPENDIX 229	471
APPENDIX 230	473
APPENDIX 231	475
APPENDIX 232	477
APPENDIX 233	479
APPENDIX 234	481
APPENDIX 235	483
APPENDIX 236	485
APPENDIX 237	487
APPENDIX 238	489
APPENDIX 239	491
APPENDIX 240	493
APPENDIX 241	495
APPENDIX 242	497
APPENDIX 243	499
APPENDIX 244	501
APPENDIX 245	503
APPENDIX 246	505
APPENDIX 247	507
APPENDIX 248	509
APPENDIX 249	511
APPENDIX 250	513
APPENDIX 251	515
APPENDIX 252	517
APPENDIX 253	519
APPENDIX 254	521
APPENDIX 255	523
APPENDIX 256	525
APPENDIX 257	527
APPENDIX 258	529
APPENDIX 259	531
APPENDIX 260	533
APPENDIX 261	535
APPENDIX 262	537
APPENDIX 263	539
APPENDIX 264	541
APPENDIX 265	543
APPENDIX 266	545
APPENDIX 267	547
APPENDIX 268	549
APPENDIX 269	551
APPENDIX 270	553
APPENDIX 271	555
APPENDIX 272	557
APPENDIX 273	559
APPENDIX 274	561
APPENDIX 275	563
APPENDIX 276	565
APPENDIX 277	567
APPENDIX 278	569
APPENDIX 279	571
APPENDIX 280	573
APPENDIX 281	575
APPENDIX 282	577
APPENDIX 283	579
APPENDIX 284	581
APPENDIX 285	583
APPENDIX 286	585
APPENDIX 287	587
APPENDIX 288	589
APPENDIX 289	591
APPENDIX 290	593
APPENDIX 291	595
APPENDIX 292	597
APPENDIX 293	599
APPENDIX 294	601
APPENDIX 295	603
APPENDIX 296	605
APPENDIX 297	607
APPENDIX 298	609
APPENDIX 299	611
APPENDIX 300	613
APPENDIX 301	615
APPENDIX 302	617
APPENDIX 303	619
APPENDIX 304	621
APPENDIX 305	623
APPENDIX 306	625
APPENDIX 307	627
APPENDIX 308	629
APPENDIX 309	631
APPENDIX 310	633
APPENDIX 311	635
APPENDIX 312	637
APPENDIX 313	639
APPENDIX 314	641
APPENDIX 315	643
APPENDIX 316	645
APPENDIX 317	647
APPENDIX 318	649
APPENDIX 319	651
APPENDIX 320	653
APPENDIX 321	655
APPENDIX 322	657
APPENDIX 323	659
APPENDIX 324	661
APPENDIX 325	663
APPENDIX 326	665
APPENDIX 327	667
APPENDIX 328	669
APPENDIX 329	671
APPENDIX 330	673
APPENDIX 331	675
APPENDIX 332	677
APPENDIX 333	679
APPENDIX 334	681
APPENDIX 335	683
APPENDIX 336	685
APPENDIX 337	687
APPENDIX 338	689
APPENDIX 339	691
APPENDIX 340	693
APPENDIX 341	695
APPENDIX 342	697
APPENDIX 343	699
APPENDIX 344	701
APPENDIX 345	703
APPENDIX 346	705
APPENDIX 347	707
APPENDIX 348	709
APPENDIX 349	711
APPENDIX 350	713
APPENDIX 351	715
APPENDIX 352	717
APPENDIX 353	719
APPENDIX 354	721
APPENDIX 355	723
APPENDIX 356	725
APPENDIX 357	727
APPENDIX 358	729
APPENDIX 359	731
APPENDIX 360	733
APPENDIX 361	735
APPENDIX 362	737
APPENDIX 363	739
APPENDIX 364	741
APPENDIX 365	743
APPENDIX 366	745
APPENDIX 367	747
APPENDIX 368	749
APPENDIX 369	751
APPENDIX 370	753
APPENDIX 371	755
APPENDIX 372	757
APPENDIX 373	759
APPENDIX 374	761
APPENDIX 375	763
APPENDIX 376	765
APPENDIX 377	767
APPENDIX 378	769
APPENDIX 379	771
APPENDIX 380	773
APPENDIX 381	775
APPENDIX 382	777
APPENDIX 383	779
APPENDIX 384	781
APPENDIX 385	783
APPENDIX 386	785
APPENDIX 387	787
APPENDIX 388	789
APPENDIX 389	791
APPENDIX 390	793
APPENDIX 391	795
APPENDIX 392	797
APPENDIX 393	799
APPENDIX 394	801
APPENDIX 395	803
APPENDIX 396	805
APPENDIX 397	807
APPENDIX 398	809
APPENDIX 399	811
APPENDIX 400	813
APPENDIX 401	815
APPENDIX 402	817
APPENDIX 403	819
APPENDIX 404	821
APPENDIX 405	823
APPENDIX 406	825
APPENDIX 407	827
APPENDIX 408	829
APPENDIX 409	831
APPENDIX 410	833
APPENDIX 411	835
APPENDIX 412	837
APPENDIX 413	839
APPENDIX 414	841
APPENDIX 415	843
APPENDIX 416	845
APPENDIX 417	847
APPENDIX 418	849
APPENDIX 419	851
APPENDIX 420	853
APPENDIX 421	855
APPENDIX 422	857
APPENDIX 423	859
APPENDIX 424	861
APPENDIX 425	863
APPENDIX 426	865
APPENDIX 427	867
APPENDIX 428	869
APPENDIX 429	871
APPENDIX 430	873
APPENDIX 431	875
APPENDIX 432	877
APPENDIX 433	879
APPENDIX 434	881
APPENDIX 435	883
APPENDIX 436	885
APPENDIX 437	887
APPENDIX 438	889
APPENDIX 439	891
APPENDIX 440	893
APPENDIX 441	895
APPENDIX 442	897
APPENDIX 443	899
APPENDIX 444	901
APPENDIX 445	903
APPENDIX 446	905
APPENDIX 447	907
APPENDIX 448	909
APPENDIX 449	911
APPENDIX 450	913
APPENDIX 451	915
APPENDIX 452	917
APPENDIX 453	919
APPENDIX 454	921
APPENDIX 455	923
APPENDIX 456	925
APPENDIX 457	927
APPENDIX 458	929
APPENDIX 459	931
APPENDIX 460	933
APPENDIX 461	935
APPENDIX 462	937
APPENDIX 463	939
APPENDIX 464	941
APPENDIX 465	943
APPENDIX 466	945
APPENDIX 467	947
APPENDIX 468	949
APPENDIX 469	951
APPENDIX 470	953
APPENDIX 471	955
APPENDIX 472	957
APPENDIX 473	959
APPENDIX 474	961
APPENDIX 475	963
APPENDIX 476	965
APPENDIX 477	967
APPENDIX 478	969
APPENDIX 479	971
APPENDIX 480	973
APPENDIX 481	975
APPENDIX 482	977
APPENDIX 483	979
APPENDIX 484	981
APPENDIX 485	983
APPENDIX 486	985
APPENDIX 487	987
APPENDIX 488	989
APPENDIX 489	991
APPENDIX 490	993
APPENDIX 491	995
APPENDIX 492	997
APPENDIX 493	999
APPENDIX 494	1001
APPENDIX 495	1003
APPENDIX 496	1005
APPENDIX 497	1007
APPENDIX 498	1009
APPENDIX 499	1011
APPENDIX 500	1013
APPENDIX 501	1015
APPENDIX 502	1017
APPENDIX 503	1019
APPENDIX 504	1021
APPENDIX 505	1023
APPENDIX 506	1025
APPENDIX 507	1027
APPENDIX 508	1029
APPENDIX 509	103

TABLE OF CONTENTS

	Page
ABSTRACT	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	v
LIST OF TABLES	vi
LIST OF FIGURES	viii
LIST OF APPENDICES	ix
INTRODUCTION	1
METHOD	14
Subjects	14
Apparatus and Testing Material	15
Procedure	17
RESULTS	22
Test of hypotheses	22
Additional findings	35
DISCUSSION	42
FOOTNOTES	48
REFERENCES	50
APPENDIX A	55
APPENDIX B	59

LIST OF TABLES

	Page
TABLE 1	
Median scale values and Thorndike-Lorge frequencies for stimulus words	15
TABLE 2	
Mean recognition thresholds (msec) of LN on LA and HA words	23
TABLE 3	
Mean recognition thresholds (msec) of SE and SI on LA and HA words	24
TABLE 4	
Table of means and t values for data in second hypothesis	25
TABLE 5	
Mean recognition thresholds (msec) of SE and SI on all the 20 stimulus words used	26
TABLE 6	
Mean recognition thresholds (msec) of NE and NI on LA and HA words	27
TABLE 7	
Table of means and t values for data on NE and NI	28
TABLE 8	
Mean recognition thresholds (msec) of NE on LA and HA words	29
TABLE 9	
Mean recognition thresholds (msec) of NI on LA and HA words	30
TABLE 10	
Mean recognition thresholds (msec) for the four diagnostic categories summed over all Ss	31
TABLE 11	
Mean recognition GSR (log conductance) of HN and LN on the critical words	32
TABLE 12	
Mean GSR values (log conductance) of NI and NE on all critical words	33

TABLE 13	Mean recognition GSR (log conductance) of Ss on HA and LA words	34
TABLE 14	Mean pre-recognition GSR (log conductance) of Ss on HA and LA words	36
TABLE 15	Mean recognition thresholds (msec) of LN and HN, E and I, for the three conditions of stimulation	38
TABLE 16	Mean recognition thresholds (msec) of Ss for HA and LA words	39
TABLE 17	Stimulus words ranked on intensity values and recognition thresholds	41
TABLE 18	Standardization groups for the MPI	48

LIST OF FIGURES

FIGURE 1	
Graph of mean recognition thresholds in relation to levels of intensity	31
FIGURE 2	
A representation of a hypothetical polygraphic tracing	62

LIST OF APPENDICES

APPENDIX A.	
The Maudsley Personality Inventory	55
APPENDIX B.	
Data sheets for scoring GSR, and a specific example	59

INTRODUCTION

Selected Review and Criticism

The term "perceptual defence" was first used by Bruner and Postman (1947). With 19 undergraduates as Ss, Bruner and Postman obtained associative reaction times for each of 99 words including a large proportion of sexually taboo words such as "raped", "penis", and "whore". Two weeks later, the authors presented tachistoscopically each S with 18 stimulus words differing in their associative reaction times. Two different patterns of response were found. Some Ss had higher recognition thresholds of the "taboo" words than that of neutral "non-taboo" words. The same "taboo" words had previously been found to produce longer reaction times than other words. Other Ss recognized the taboo words more quickly than the neutral words. In attempting to arrive at an explanation of the two behavior patterns, the authors suggested that some individuals showed evidence of a defence process in which recognition threshold was a monotonic increasing function of associative reaction time. The delayed recognition was then termed "perceptual defence" and the reverse of it "perceptual vigilance". "Perceptual defence" then was conceived as being in the service of the self, protecting it from anxiety. The greater the anxiety, the greater the "perceptual defence".

Following the Harvard studies of Bruner and Postman, much research interest was generated by the topic of sensitization to threat and perceptual defence, more especially amongst psychoanalytically inclined clinicians concerned with the question of Repression-Sensitization. However, the real introduction of "perceptual defence" into psychological literature and controversy is properly attributed to McGinnies.

McGinnies (1949) observed that Galvanic Skin Responses accompanying the presentation of "taboo" (sexually taboo) words were of greater magnitude than those accompanying the presentation of "neutral" (non-sexual) words, even when

the words were presented below their recognition thresholds. Ss also gave higher recognition thresholds for the taboo words than for the neutral ones. McGinnies maintained that the emotionality of the sex words was responsible for the heightened GSRs and the heightened recognition thresholds. Ss were unconsciously avoiding these anxiety-provoking words through a general process of conditioned avoidance of verbal responses "having unpleasant meanings to the observer". The stimulus words as it were,

served as a cue to deeply embedded anxiety which is revealed in autonomic reactivity as measured by the GSR. Avoidance of further anxiety is contemporaneously aroused in the form of perceptual defence against recognition of the stimulus object. (McGinnies, 1949, p. 251).

It was these interpretations of McGinnies' results which generated the spate of critical articles and the voluminous research reports in this area. Most of these were designed with the sole aim of proving McGinnies wrong and thereby rendering the concept of perceptual defence invalid. Only a fraction of all the studies dealing with attempted demonstration, explanations and criticisms of findings in this area can be mentioned. The most immediate criticism came from Howes and Solomon (1950).

Howes and Solomon argued that word frequency and response suppression adequately explained McGinnies' results. The sexual words used by McGinnies were, according to the Thorndike-Lorge Word Count (1944), much less familiar words than the neutral words with which they were compared. The recognition thresholds for words were then shown by the authors to be an approximate linear function of the logarithms of the relative frequencies of usage, as given by the Thorndike-Lorge Word Count. This being the case, lower thresholds for neutral words were to be expected regardless of differences in emotionality. McGinnies (1950), McGinnies and Sherman (1952) in a rebuttal, maintained that emotional arousal by the stimulus was responsible for the results. They demonstrated that previously "neutral" words with lower recognition thresholds had higher recognition

thresholds when their presentation was merely preceded by sexually taboo words to which Ss did not have to respond. But despite McGinnies' (1950) and Sherman's (1952) rebuttal, this was a very telling criticism of McGinnies' conception of perceptual defence. However, the experiment by Postman, Bronson and Gropper (1953) illustrates best the complexity of factors involved in perceptual defence experiments.

Postman, et. al (1953) selected seven taboo words and eleven neutral words with regards to frequency and length from the Thorndike-Lorge Word Count. The words were presented to Ss and the number of presentations required for recognition was used as a measure of the recognition level. Ss were divided into four groups:

- 1) uninformed group who were given only the ordinary instructions for recognition when a tachistoscope is used.
- 2) informed group who were told that some, not all, of the words would be of a kind not usually used in "polite" society.
- 3) facilitation group who were given the instructions of the informed group with the added explanation that patients with emotional problems are very anxious about reporting some of the words and have difficulties in recognizing them.
- 4) inhibition group who were also given the informed group's instructions with the addition that most normal people, and particularly those socially successful, found it hard to recognize these words and were anxious about them when they were seen.

The Es then made three predictions. The first prediction was that there would be no difference in the recognition level of taboo versus neutral words. Secondly, with respect to the differences between the groups, they predicted that the informed group would have a lower recognition threshold than the un-

informed group and that the facilitation group would have a lower threshold than both the informed group and the inhibition group. Finally, the Es thought that the relationship between the sex of S and E might be another variable. Clearly then, the aim of the experiment was to demonstrate that the results hitherto subsumed under the title of perceptual defence were only a function of such factors as word frequency, instructions affecting Ss' response set and E,S, sex interaction.

The first observation was the actual finding of lower recognition thresholds for the sexual words, than the neutral ones. The difference was highly significant. This led the Es to conclude that there was no evidence for perceptual defence. Because instead of the emotional (sexual) words being defended against, Ss actually perceived them much, much faster. A proponent of McGinnies' conception of perceptual defence could try to explain away these results in terms of relative frequency with which two kinds of stimulus words had previously been encountered by the subjects. It can be argued with some justification that the frequency, and consequently the familiarity of Ss with the sexual words was underestimated by the experimenters. This underestimation was caused by the fact that the word counts were based on the frequency in the written language in which sexual (taboo) words appear less frequently than in every day spoken language. Thus it could be contended that differences in frequency cancelled out the effect of perceptual defence. However on theoretical grounds one would expect that perceptual defence mechanisms against anxiety producing stimuli should be independent from the frequency of previous exposures to them, if these stimuli still produce anxiety.

Secondly, the Es found, as predicted, that the uninformed group had a significantly higher threshold of recognition than did the informed group, and the facilitation group had the lowest recognition threshold of all the groups. This finding was taken to indicate the importance of the particular instructions given to Ss, i.e. the importance of set.

Thirdly, the Es found the thresholds to be higher in females than males. These results were attributed to differences of frequency of use and willingness to report sexually taboo words by females and males in the middle class American culture.

The results of the S-E interaction were not significant. No doubt, such a relationship could well be another variable accounting for the results subsumed under the concept of perceptual defence, as advanced by McGinnies.

This experiment clearly cast some doubt on the idea of perceptual defence as suggested by McGinnies. The results of the above study were confirmed by other investigations (Lacy, Lewinger and Adamson, 1953). At the same time, the experiment did demonstrate the relevance of a number of other variables, such as response set. The most important finding however was a significant difference between reported thresholds for sexual (threat/high arousing) versus non-sexual (non-threat/low arousing) stimuli, indicating the presence of perceptual vigilance, rather than that of perceptual defence.

Despite these findings, supporters of McGinnies' interpretations continued to produce more and more empirical evidence to back-up their contention of a defensive phenomenon (Cowen and Beire, 1954; Cowan and Obrist, 1958; Davis, 1959). Other reports claim that even when factors such as frequency, familiarity, and response suppression are controlled or accounted for, perceptual defence as a blocking mechanism due to stimulus emotionality is still demonstrated (Blum, 1954; 1955; 1957; Nelson, 1955; Mathews and Wertheimer, 1958). Although these studies utilized a variety of S populations, perceptual tasks, and measures of perceptual defence which were of dubious value, they did establish the fact that increases in the emotion arousing properties of stimuli are often accompanied by a raising of recognition thresholds for the stimuli used.

However, the opposite phenomenon of perceptual vigilance has also been supported by solid empirical evidence. Many experiments have demonstrated that

rather than "avoiding" the perception of "threat", Ss actually perceive the "threatening" stimuli faster than the "non-threatening" stimuli (Postman and Brown, 1952; Datson, 1956; Ericksen and Browne, 1956; Scott, 1957; Levy, 1958). Thus, no matter what the explanatory concept may be, empirical review establishes the existence of a significant relationship between perceptual behaviour and stimuli often referred to as highly arousing, threatening, or emotional. The nature of the relationship is such that sometimes the recognition threshold is an increasing linear function of the emotion arousing property of the stimulus, and sometimes, it is a decreasing function of the emotion arousing property of the stimulus. Psychoanalytically supporters of the perceptual defence concept have accepted these contradictory results, and have explained them with the help of the "Repression-Sensitization" construct. Perceptual defence corresponds to repression, and perceptual vigilance corresponds to sensitization. In this way both the phenomenon of raised and lowered thresholds to arousing stimuli were viewed as unconsciously motivated anxiety-reducing mechanisms, (Ericksen, 1954; Ericksen and Lazarus, 1952; Byrne, 1961, 1964). In his criticism of the concept of perceptual defence, Goldiamond (1958) questioned the whole assumption that perception is implicated in the findings of the perceptual defence experiments.

Goldiamond (1958; 1960 and 1962) put forward a basic methodological criticism. The gist of his criticism is that the evidence for perceptual defence is based on the verbal responses of Ss, which by their very nature, are very poor indicators of perceptual recognition. Goldiamond maintains that because different stimuli are involved, Ss' response biases would not be the same. The differences in performance between stimulus absent and stimulus present cannot therefore be properly assigned to a perceptual phenomenon. This psychophysical point was illustrated this way:

S answers a multiple choice examination of the object type with 5 alternatives; E's key is punched so that alternative B is correct right down the line. Given two groups of Ss, one with a slight tendency to respond with a B, Group BR, and one without such a tendency, Group OR, then on the basis of this alone, BR should produce B responses earlier than OR, therefore be correct earlier, that is at a lower question number. If, now, instead of numbering the questions in ascending integers, 1,2,3,...,n, the usual procedure, E numbers them in ascending durations, 0.01, 0.02, 0.03,...,n, seconds, and calls the first congruence recognition threshold, BR should also have a lower recognition threshold expressed in time,...or whatever procedure is used. (Goldiamond, 1958, p. 396).

According to Goldiamond then, a bias against using a word, will give it the appearance of being difficult to recognize, and a bias in favour of using it, will give it the appearance of being easy to recognize. As such, differences in threshold measures will not necessarily indicate parallel differences in the ease of recognition of the stimulus word concerned. The presence of response bias therefore provides a parsimonious explanation of perceptual defence, one for which there has recently been much support (Goldstein, 1962; Notham, 1962; Zajonc, 1962).

Counter evidence was immediately advanced to discredit a response bias interpretation by supporters of perceptual defence. They argued that from the theoretical point of view there is no reason to expect "emotion-arousing" properties to have greater effect on verbal response tendencies than on the processes of perceptual recognition. Direct experimentation, measuring both response bias and perceptual defence, with an expanded definition (Brown, 1961), provided evidence in favour of perceptual defence (Bootzen and Natsoulas, 1965; Minard, 1963, 1965; Mathews and Wertheimer, 1958).

Summarizing, what seems to have emerged from the review, is the fact that there is some relationship between stimulus intensity (emotion arousing property) and ease of recognition. Divergent points of view have been advanced to account for the results. The interpretations have tended to be mainly speculative and psychologists are left with the basic problem of finding the

antecedents, correlates, and consequents of the observed phenomena. A good beginning at integrating the factors involved.

Integration

Brown (1961) suggested that both a rise and fall of thresholds should be subsumed under the mechanism of perceptual defence. He went on:

"recognition thresholds at first rise with increase in stimulus emotionality, but reach a peak, and subsequently fall with further increases in stimulus emotionality." (Brown, 1961, page 39).

Using this model, one could explain all the contradictory findings. The first work of Brunner and Postman (1947) and the reports by Delucia and Stagner (1953) will tend to support this hypothesis. Brown then expanded his model to take in individual differences, by saying

That recognition thresholds at first rise with increases in stimulus emotionality, but reach a peak, and subsequently fall with further increases in stimulus emotionality; and that the amount of stimulus emotionality required to bring recognition thresholds to their peak is directly related to the degree of extraversion of S. (Brown, 1961, p. 55)

What Brown suggested then was the fact that individuals do vary in the amount of stimulus emotionality required to bring them to their recognition peaks. This of course was not a new idea. Ericksen (1953) had stressed the importance of personality in perceptual defence, and many other investigators carried out a number of experiments to try and establish the personality variables which were crucial to perceptual defence. For example, Lewinson (1954) and Greenbaum (1956) found that high scorers on the Taylor Manifest Anxiety Scale, had lower recognition thresholds for emotional words than low scorers on the same scale. Ericksen and Browne (1956), Kleinman (1957), Mathews and Wertheimer (1958) all found a relationship between the psychasthenia-hysteria dimension of the MMPI and recognition thresholds--the hysteria end being associated with higher thresholds for emotional words. The difference between the earlier studies and that of Brown lies in the fact that he did introduce the concept of amount of stimulation

varying on a continuous dimension of the intensity of the emotion aroused by the stimulus. Furthermore, his allusion to Eysenck's concept of extraversion opens up interesting possibilities for examining the implication of individual differences in perceptual defence from the point of view of a theory of personality. This theory would permit ready deductions to be made from it. Finally, Brown's simple approach to perceptual defence as merely a descriptive term for empirically observed results makes the task of trying to investigate the factors which may be responsible for the observed results easier.

Rationale and Direction of Study

Brown supported his theory by only one empirical study (Brown, 1961) in which he found that introverts, as defined by the score on MPI, had their highest recognition thresholds at lower stimulus intensity than extraverts. The present investigation seeks to expand on Brown's theory and tests specific deductions derived from the personality theory of Eysenck (1947, 1957, 1965) alluded to by Brown. The present study has a dual purpose. First, the attempt was made to explain the individual differences in perceptual defence by relating them to differences in arousal rather than to differences in ego defences, a vague and questionable concept. A brief comment on Eysenck at this point will clarify the purpose of the present investigation.

In Eysenck's typology, extraverts are postulated to be constantly under the influence of cortical inhibition. They develop inhibition rapidly and excitation very slowly, but dissipate the inhibitory potentials very slowly, and the excitatory potentials very rapidly. The net outcome is that extraverts have a resistance to arousal and are innately more inert to stimulation. Hence extraverts should have higher thresholds for arousing stimuli, than introverts.

Introverts are postulated, in the same system, to be predominantly under cortical excitation. They are characterized by a preponderance of excitatory processes. They are therefore innately more sensitive to stimulation. Since they do not have a damping mechanism in their reticular activating system as extraverts are supposed to have, introverts should have generally lower recognition thresholds than extraverts when responding to emotional (arousing) stimuli.

The second dimension, neuroticism, is postulated to be closely related to an excessive lability of the sympathetic nervous system. High scorers on neuroticism are therefore predisposed to respond more strongly and more quickly with their sympathetic autonomic nervous system. Neurotics should therefore show greater autonomic reactivity and responsivity.

Eysenck (1959) also reported that while extraversion factor is orthogonal to that of neuroticism for a population of Ss who score low on neuroticism (stable introverts and stable extraverts), there is a correlation between introversion and neuroticism in populations scoring high on neuroticism (the correlation rises to between 0.3 and 0.4). Neurotic introverts tend to score higher on neuroticism than neurotic extraverts. Therefore, it may be predicted that while stable introverts and stable extraverts do not differ in the sympathetic responsivity, neurotic introverts show higher responsivity than neurotic extraverts. However, Callaway and Thompson (1953) proposed a hypothetical mechanism relating the activity of the sympathetic nervous system and the breadth of attention which would modify prediction made by Eysenck's theory.

The authors suggested that a threat to the organism which induces a sympathetic discharge must in turn bring about a reduction of the sensory input which will tend to decrease the level of activity of the sym-

pathetic nervous system (ie. a negative feedback mechanism). Otherwise if increased sympathetic activity produced a lowering of threshold, there would be a constant rise of sympathetic activity to an intolerable limit. This model was supported by a series of empirical investigations (Callaway and Dembo, 1958; Callaway and Band, 1958); (Agnew and Agnew, 1963; Bharucha-Reid, 1962).

Taking into consideration both Eysenck's theory of the properties of the nervous system linked up with personality types and Callaway's theory of negative feedback a prediction can be made that while stable extraverts have the lowest basic sensitivity to external stimuli, the neurotic introverts have the highest such sensitivity with the other two groups falling in the middle. These differences in sensitivity are due to the combination of the central excitatory state of the cortex and the basal level of sub-cortical arousal. However when the sensitivity to stimulation reaches a critically high point a negative feed back, postulated by Callaway starts operating, reducing the sensory input and raising the perceptual thresholds, particularly to intense or emotion arousing stimuli. Therefore any stimuli which are likely to produce an excessive arousal such as threatening stimuli, would lead to a narrowing of attention and reduction of sensory thresholds. If this is true, neurotic introverts can be predicted to have higher thresholds of recognition for highly arousing (e.g. threatening stimuli) than low arousing (non-threatening) ones. Also, it can be predicted that the curve representing the relationship between perceptual thresholds and psychological types will be at an inverted U shape with stable extraverts and neurotic introverts having lower thresholds than the other two groups.

The testing of these hypotheses is the central theme of this study.

Statement of Hypothesis

For the purpose of this study, perceptual defence is to be understood as a descriptive term describing any systematic relationship between stimulus emotion arousing property (intensity) and the rapidity of recognition. The stimuli to be used also will be aggressive (hostile) words. It is hoped that the choice of aggressive stimuli may avoid some of the difficulties inherent in the use of sexual stimuli. There are no empirical studies which suggest that Ss do not verbalise aggressive words as they do sexually "taboo" words. Also on a priori grounds, since unlike with the sexual words there is no taboo on aggressive words in our culture, it is unlikely that there will be a response bias against these words, when they are used as stimuli. A second consideration for selecting aggressive words over sexual words lies in the fact that there is a list of such words which permits the ordering of stimuli on an intensity dimension. Almost all the studies of perceptual defence were carried out on the assumption that a stimulus must be either emotional or neutral. This is obviously not a reasonable assumption. It is much more likely that stimuli will tend to vary on a continuous dimension of intensity from very high to very low, i.e. high emotional to low emotional. The third reason for selecting aggressive stimuli stems from the desire to demonstrate that there is some empirical evidence suggesting that the stimulus chosen relates to some measure of emotional reactivity or arousal. A few studies report finding a significant relationship between some physiological measures of emotional reactivity or arousal and aggressive stimuli.

Ellsworth (1953) found that GSR changes of women college students in response to hostile words were higher than those to neutral words. Diers (1955)

found that when women were required to respond by reading hostile sentences, they gave greater GSR responses. Sines (1957) measured GSR, Respiration Rate, and Heart Rate, as a response to aggressive, passive-dependent and heterosexual pictures. He reported that hostile pictures produced the greatest index of physiological arousal. Buss (1961) found positive evidence for this view that aggressive stimuli of varying intensities produce progressively greater reactivity. Through these studies, Buss (1961) eventually constructed a scale of aggressiveness for words. The scale was used for selecting aggressive stimuli for the present investigation.

Specifically, on the basis of Eysenck's and Callaway's theories, the following hypotheses were tested:

- 1) Low Aggression words (LA words) will produce higher recognition thresholds than High Aggression (HA words) in low neurotics.

LN (LA words) $>$ LN (HA words) where $LN \subseteq SE$ and SI

- 2) In general, Extraverts (SE) will have higher recognition thresholds than Introverts (SI) for all categories of the aggression words

SE (ALL words) $>$ SI (ALL words)

SE (LA words) $>$ SI (LA words)

SE (HA words) $>$ SI (HA words).

- 3) Neurotic Extraverts (NE) will tend to give higher recognition thresholds with LA words than with HA words

NE (LA words) $>$ NE (HA words).

- 4) Neurotic Introverts (NI) on the other hand will tend to give higher thresholds of recognition with HA words than LA words

NI (HA words) $>$ NI (LA words).

- 5) In general High Neurotics (HN) will give greater sympathetic reactivity than Low Neurotics (LN) under all conditions of stimulation

HN (ALL words) GSR $>$ LN (ALL words) GSR where $LN \subseteq SE \& SI$
 $HN \subseteq NE \& NI$

6) Neurotic Introverts will give greater sympathetic responsivity than Neurotic Extraverts

NI (ALL words) GSR > NE (All words) GSR.

7) High aggression words will produce greater sympathetic reactivity than low aggression words.

(HA words) GSR > (LA words) GSR.

METHOD

Subjects

40 Ss, 23 female and 17 male, were tested, but only 39 were used in the analysis. The testing of one S who complained of feeling uncomfortable had to be discontinued. The sample was drawn from student nurses at the University Hospital, paid volunteers, and students taking the first-year course in Psychology at the University of Alberta, Edmonton, during session 1966-1967. Each S completed the Maudsley Personality Inventory (MPI)¹. On the basis of Ss' scores on the Neuroticism and Extraversion scales, Ss were assigned to one of four groups.

Neurotic Extraverts Group (NE). All Ss who obtained a score above the median on the MPI Neuroticism (i.e. 12) and Extraversion (12) scales, were placed in this group. There were 15 NE.

Neurotic Introverts Group (NI). This group included all Ss who scored above the median of the MPI Neuroticism scale, but who obtained a score below the median of the MPI Extraversion scale. There were 4 NI.

Stable Extraverts Group (SE). Ss who scored below the median of the MPI Neuroticism scale but scored above the median of the MPI Extraversion scale were put in this group. There were 13 SE.

Stable Introverts Group (SI). In this group, all Ss who scored below the median on both the MPI Neuroticism and Extraversion scales were in-

cluded. There were 7 SI. NE and NI were collectively referred to as High Neurotics (HN), whereas SE and SI were collectively called Low Neurotics (LN).

Apparatus and Testing Material

Stimulus Words. The selection of words was based on the median scale value for hostile words provided by Buss (1961)². The 20 words finally selected are presented in Table 1.

Table 1

Median scale values and
Thorndike-Lorge frequencies for
stimulus words

Word	Average Agres- sivity value	Frequency Count	
		Thorndike- Lorge	No. of letters
Contest	1.65	31	7
Dissent	3.20	4	7
Contrary	3.20	46	8
Teasing	3.05	14	7
Peevish	3.40	2	7
Chiding	3.45	6	7
Nuisance	3.65	10	8
Reproof	3.8	4	7
Dislike	3.95	23	7
Grouchy	3.9	1	7
Kicking	6.6	47	7
Slander	6.65	6	7
Abusive	6.6	1	7
Loathing	7.0	7	8
Enraged	7.3	6	7
Revenge	7.2	29	7
Furious	7.35	21	7
Mauling	7.75	2	7
Mangling	7.95	5	8
Torture	8.75	25	7

From the 20 words, the 5 least aggressive words were defined as Low Aggression Words (LA words), and the 5 most aggressive words were defined as High Aggression Words (HA words). The words were controlled for both structure and frequency. The familiarity with the words was controlled for by choosing words equated for frequency on the basis the Thorndike-Lorge word frequency count (Thorndike and Lorge, 1944). The mean frequency value for LA words was 11.8 and for HA words was 11.4. The difference between the means was non-significant ($t=0.047$, n.s., $df: 19$). The words were printed in block letters (size 0.2 in.) using standard print, on 4" by 5" white cards.

Projection Tachistoscope. A two channel Scientific Prototype Tachiaroscope, Model 800E was used. This unit is divided into an optical system and an electronic control, both housed in the same cabinet. The optical system is a two channel Dodge type with a single mirror to mix the images in the two separate channels. The two channels of the optical system each contains two lamps and two reversible stainless steel card holders for standard 4" by 5" cards or filters. The electrical intensity controls span about one log unit. The duration, intensity, and firing sequence are controlled electronically.

The electronic unit contains two time interval generators, each of which covers the range of 1 msec to 11 msec in four direct reading overlapping ranges. A decade range switch and an 11 to 1 vernier control the timer duration.

A pulse generator is built into the tachistoscope to start the timers in response to a switch closure. In this study, a remote switch was used consisting of a three wire P.L. 68 telephone plug inserted into the jack next to the push-button. Two leads from this wire hooked

up the tachistoscope to a marker attached to the polygraph in such a way that pressing the remote button fired the tachistoscope and at the same time marked the drive chart. In this way, the precise time of presenting each stimulus was marked on the recordings. The calibration of tachistoscope was such that the minimum duration of stimulus presentation was 10 msec.

Polygraph. One channel of Grass Instrument Model 5 Polygraph was used to measure the skin resistance throughout the investigation. This consisted of a Grass Instrument Model 5PI Low Level D.C. pre-amplifier, a Grass Instrument Model 5E D.C. Drive Amplifier and Model DWCI Polygraph Drive Amplifier, Oscillograph and Drive Chart. The calibration (using standard information provided) permitted the pen deflection sensitivity, in terms of resistance, to be read directly in ohms per centimeter, from the Sensitivity selector switch by multiplying the reading on the switch by 10,000. For this study, the switch was set at 0.2MV/CM, for all Ss. Throughout the experiment, a constant current of 50 microamps were passed through the applied electrodes. Finally, the instrument was run in the MINUS UP position. This meant that an upward pen deflection always indicated a decrease in resistance.

Electrodes. To avoid polarisation, and thereby the generation of a back electromotive force (EMF), which raises Ss' resistance above the true value, non-polarisable electrodes were made using the basic principles suggested by Lykken (1959). These were zinc electrodes used with zinc sulphate electrode paste.

Procedure. Ss were routinely introduced to the equipment in the research room and permitted some time to get used to the experimental

situation. The tests were conducted in a general hospital (University Hospital, Edmonton). After five minutes of entering the research room and getting acquainted, each S received the following instructions:

The first part of this experiment entails filling out the questionnaire in front of you. To make sure that you clearly understand the instructions, I shall read them once together with you. Now, look at the instructions at the top of your copy, while I read from mine.

After reading this instruction, S was allowed time to complete the MPI test. To ensure that S answered the questions without suggestion from the experimenter, no interpretation of the questions was given to those who sought it. They were simply told to respond to the particular question the best way they could. The MPI (1959) questionnaire used is attached in Appendix A.

On completion of the questionnaire, each S received the following instructions:

You have now told us the way you feel and behave. Now we want to measure the way you feel and behave on a physiological level. In order to do this, we need to attach some measuring devices on you, one on your thumb and the other on your arm. Perhaps you have already recognized that these are electrodes.

After these instructions, the electrodes were cleaned to remove any films which might be on their surfaces till their surfaces shone. Sand paper was used. Following this, the sites for attachment were prepared.

Preparation of Sites for Electrodes

Attachment of Active Electrode. Each S had the volar surfaces of their thumbs examined for cuts or punctures. Since cuts and punctures greatly reduce skin resistance, the thumb with no cuts was selected. Using a fresh piece of adhesive tape, the volar surface

of the selected thumb was cleaned of excess grease and other natural oils until a fresh piece of the tape adhered. A self-adhesive annular corn plaster was used to delimit the central whorl of the thumb print for electrical contact with the zinc electrode. The central hole of the corn plaster was filled with electrode jelly, prepared according to Lykken's (1959) formula. The electrode was attached and held in place by two pieces of tape wrapped around the thumb.

Attachment of Inactive Electrode. A small area of the dorsum of the forearm was sand papered until the superficial layer of the epidermis was removed. This was taken as adequate degree of preparation of the site for the inactive electrode. The purpose of this procedure was to produce an area which will contribute minimally to the total resistance.³

After adequate preparation, an adhesive corn plaster was again used to delimit the sand-papered area. Its central hole was filled with Lykken's electrode jelly and the inactive electrode attached. Two wraps of tape around the arm held it in position. S was guided to a chair in front of the tachistoscope. The leads from S's electrode were attached to the input terminals provided at the end of the Preamplifier input cable. Next, the baseline was established.

Establishing the Baseline. As a reference point for measuring all proper D.C. voltages, the baseline point represents a zero signal to the amplifying system and is independent of changes in amplifier sensitivity. Using standard provided information, the baseline was established and checked for balance.

Arranging the Polygraph for GSR Measurement. Both the MV and the Sensitivity switches were set at zero. The Input selector was switched to PGR and the Balance Voltage switch in the minus position. With the Drive Amplifier turned on in the -USE (down) position, the sensitivity selector was moved from zero to 20MV/CM. There was a slight pen deflection from the baseline. Using the Balance Voltage controls, the pen was adjusted to baseline. The sensitivity was then increased from 20, step by step to 0.2MV/CM. At each step, the pen was returned to baseline. At 0.2MV/CM, after the pen was returned back to baseline, time was allowed (about 4 minutes) for stabilization, and S baseline skin resistance read directly from the balance controls. With the MV switch set at zero, the resistance, in ohms, was given by the reading on the IMV/TURN control.

Measuring Perceptual Thresholds. With S sitting and looking directly through the view finder of the tachistoscope, adjustments were made to permit S to fixate the screen with little strain, movement and discomfort. S was then given the following instructions:

This is an experiment on visual perception. I am going to flash some words on the screen and request that you identify them. Every word will appear for only a brief period. If you recognize the word, call it out. If you are right, I shall remove the word and after a brief period, flash a new one altogether. If your answer is incorrect, I shall flash the same word again and again, with brief periods in-between, until you can see it. To enable you to fixate the screen, I shall snap my fingers, a kind of "ready" signal. About two seconds after the snap, a word will appear on the screen for a brief period. All you are required to do is call the word out as soon as you see it. You may find some words easier to see than others, or you may not notice any difficulty with any of the words. This should not worry you since all Ss tested tend to show their own unique ways of seeing. This is not a test of your intelligence, and there is no pass or failure associated with any aspect of this experiment. We are only interested in finding out how different people perceive differently. If you have

any questions concerning what you are expected to do, or if there is any aspect of the instructions which you do not understand, I shall be glad to deal with them now.

Most Ss said they understood the instruction. Those who had any questions were given appropriate answers. After this, a specific procedural example was carried out using the word "hilly". Three minutes were allowed after the practice session for GSR stabilization.

Using constant room illumination, the 20 stimulus words were presented to each S. Each word was exposed first, at 10 msec. Thereupon, the exposure duration was increased by 10 msec at a time until S correctly recognized the word. Presentation was random, and the criterion of correct recognition was the first correct identification of the stimulus word. Recognition thresholds were given by the exposure time, in msec, at the trial of correct recognition. From the polygraph recordings, GSRs were obtained by conversion.

Scoring the GSR. GSR readings were taken directly in terms of differences in resistance from an adjusted basal resistance level and then converted into differences of conductances. Since Ss did show continual shifts of basal resistance level, the basal level for each stimulus word was taken as the resistance at the time of presentation of the stimulus. And the response to the word was given by the difference between the resistance recorded within 10 seconds following stimulus exposure at trial of recognition and the resistance recorded at the time the trial of recognition commenced. (i.e. at stimulus presentation). In this study, only the maximum deflection (both positive and negative) which occurred within 10 seconds following stimulus exposure was taken as response to the stimulus. Since resistance was automatically re-

corded at every exposure trial, words which were exposed more than once permitted the measure of responses which were given before correct recognition (i.e. verbalisation). These responses were labelled pre-recognition responses, and they were obtained by taking the maximum deflection before the final recognition trial. GSR scores were analysed as the change in log conductance (Lader, 1963; Montagu & Coles, 1966), which is defined as the ratio of final conductance to initial conductance at the start of response. A specific example of how the GSR was scored is presented in Appendix B.

Statistical Analysis of the Data. Data were analysed by t tests, a rank order correlation and graphs. Analysis of variance was rejected because of the unequal ns and the lack of proportionality of scores within the unequal group sizes. Five percent level of significance was accepted as the level of confidence.

RESULTS

Test of hypotheses. Table 2 presents difference for recognition thresholds for HA and LA in the Low Neuroticism group (stable extraverts and stable introverts combined). As can be seen from Table 2, of the 20 Low Neurotics (LN), only 3 gave recognition thresholds opposite to the direction predicted in the first hypothesis. The remaining 17 gave higher mean thresholds of recognition to LA words than to HA words. The test of significance of the difference between the mean thresholds of LN on LA words and HA words gave a significant result ($t = 2.275$, $p < 0.05$, $df: 19$). The first hypothesis is therefore supported. Low Neurotics, i.e. Stable Extraverts and Stable Introverts, recognised high aggression words faster than low aggression words.

Table 2

Mean recognition thresholds
(msec) of LN on LA and HA words

Ss	Mean thresholds of recognition		
	LA words	HA words	Difference
1	16	10	6
2	48	26	22
3	30	58	-28
4	20	18	2
5	22	10	12
6	16	10	6
7	30	26	4
8	20	18	2
9	18	12	6
10	22	12	10
11	22	20	2
12	23.3	15	8.3
13	18	14	4
14	28	22	6
15	22	26	-4
16	26	18	8
17	26	12	14
18	44	32	12
19	28	30	-2
20	22	14	8

Table 3 gives the mean recognition thresholds for
Stable Extraverts and Stable Introverts on LA and HA words.

Table 3

Mean recognition thresholds
(msec) of SE and SI on LA
and HA words.

Ss	LA words		HA words	
	SE	SI	SE	SI
1	20	16	18	20
2	22	48	10	26
3	16	30	10	58
4	30	22	26	20
5	20	23.3	18	12
6	18	18	12	14
7	22	28	12	22
8	22		26	
9	26		18	
10	26		12	
11	44		32	
12	28		30	
13	22		14	
Sum	316	185.3	238	162
n	13	7		
Means	24.31	26.47	18.31	23.14

In both cases, the overall mean thresholds of SI were higher than those of SE. This finding is contrary to the second hypothesis which predicted higher thresholds for SE. Tests of significance of differences between the appropriate pairs of means yielded non-significant *t* values. Table 4 summarises the results obtained.

Table 4

Table of means and t
values for data in
Second Hypothesis

Stimulus Condition	SE	SI	Difference	t	p
LA words	24.31	26.47	- 2.16	0.5684	0.05 (n.s.)
HA words	18.31	23.14	- 4.83	0.9046	0.05 (n.s.)
Diff.	-6.00	-3.33	2.67		

Hypothesis number two must therefore be rejected. In view of the fact that the difference found was in the opposite direction to that predicted, but did not reach the level of significance, an additional test was done on all the stimulus words used to determine the generality of the reversal tendency in LN. Table 5 shows the mean thresholds of recognition for SE and SI on all the stimulus words.

Table 5

Mean recognition thresholds
(msec) of SE and SI on all
the 20 stimulus words used.

Ss	Mean recognition thresholds	
	SI	SE
1	15.5	17.5
2	37.5	16
3	29	13.5
4	17.9	26.5
5	18.6	19
6	15	12.5
7	19	16.5
8		23
9		22
10		18
11		26.5
12		23
13		17
Sum	152	251
n	7	13
Means	21.785	19.307
Difference: 2.478		
t: 1.823 (n.s. $p > 0.05$)		

A two tailed test of the difference does not reach the significance level. However there is a trend ($p < 0.1$) of the difference in the opposite direction from that predicted. Thus in Low Neurotics, introverts actually have a tendency to have higher thresholds than extraverts. Before testing the third hypothesis, the recognition thresholds of High Neurotics were examined to see if the trend observed with Low Neurotics for introverts to have higher recognition thresholds persisted in HN.

Table 6 gives the mean recognition threshold for NE and NI Ss on LA and HA words.

Table 6

Mean recognition thresholds
(msec) of NE and NI on LA

Ss	LA words		HA words	
	NE	NI	NE	NI
1	16	14	10	12
2	28	26	18	28
3	18	24	12	42
4	12	22	16	64
5	22		14	
6	22		20	
7	28		10	
8	20		16	
9	18		12	
10	40		20	
11	22		16	
12	12		10	
13	30		20	
14	20		20	
15	20		10	
Sum	308	86	224	146
n	15	4		
Means	20.53	21.50	14.93	36.5

The summary Table, Table 7, shows that for LA words, the overall mean recognition threshold of NE was almost the same as that of NI. In the case of HA words, the overall mean recognition threshold of NI group was much higher than that of NE. A test of significance of the difference between the means yielded a t value of 3.742 ($p < 0.01$, $df: 17$). These results are highly significant and confirmed findings with LN Ss. The difference is in the direction opposite to that which could be predicted from Eysenck's system. NI have significantly higher recognition thresholds than NE for HA words.

Table 7

Table of means and t values
for data on NE and NI

Stimulus Condition	NE	NI	Difference	t	p
LA words	20.53	21.50	-0.97	0.1213	n.s.
HA words	14.93	36.50	-21.57	3.742	0.01
Difference	5.60	-15.00	20.60		

Both the summary tables for LN and HN point consistently to the fact that the difference is observed most vividly with HA words. In view of the importance of these findings, just as was the case in LN, the recognition thresholds of NE and NI on all the words were compared. NE had an overall mean recognition threshold of 17.00 msec while NI had that of 25.6 msec. The difference between the means was 8.5 msec. This again was in a direction opposite to that which could be predicted. When the difference was tested for significance, a highly significant result was obtained ($t=3.633$, $p<0.01$, $df: 17$). NI gave significantly higher mean recognition thresholds than NE. The data in Table 8 present mean recognition thresholds of NE Ss for LA and HA words.

Table 8

Mean recognition thresholds (msec)
of NE on LA and HA words

Ss	LA words	HA words	Difference LA-HA
1	16	10	6
2	28	18	10
3	18	12	6
4	12	16	-4
5	22	14	8
6	22	20	2
7	28	10	18
8	20	16	4
9	18	12	6
10	40	20	20
11	22	16	6
12	12	10	2
13	30	20	10
14	20	20	0
15	20	10	10

From the data, only one NE gave higher mean recognition thresholds to LA words than HA words. A test of significance between the differences of the means yielded a highly significant t value of 4.282 ($p < 0.01$, $df: 14$). It was concluded therefore that NE gave higher thresholds of recognition with LA words than with HA words. Thus these data support the third hypothesis.

Table 9 presents the recognition thresholds of NI Ss for LA and HA words relevant to the fourth hypothesis.

Table 9

Mean recognition thresholds
(msec) of NI on LA and HA words.

Ss	Mean recognition thresholds		
	LA words	HA words	Difference
1	12	14	- 2
2	28	26	2
3	42	24	18
4	64	22	42

Except for the first S, all Ss gave higher thresholds with HA words. Summing over all Ss, NI gave an overall mean recognition threshold of 36.5 msec to HA words and a mean threshold of 21.5 msec to LA words. A test of significance of the mean difference yielded a non-significant t of 1.204 (n.s., $df: 3$). It could be that the non-significant result of the " t " test was due to the small size of the sample of only 4 NI subjects. The difference was in the predicted direction and with a larger sample could have been significant. Therefore the confusion about accepting the null hypothesis has to be drawn with caution.

Table 10 summarizes all the results on recognition thresholds in the four diagnostic categories.

Table 10

Mean recognition thresholds
(msec) for the four diagnostic
categories summed over all Ss.

Diagnostic category	Mean recognition thresholds		
	ALL 20 words	HA words	LA words
SE	19.31	18.31	24.31
SI	21.79	23.14	26.47
NE	17.00	14.93	20.53
NI	25.62	36.50	21.50

With: 1) ALL words $NI > SI > SE > NE$
 2) HA words $NI > SI > SE > NE$
 3) LA words $SI > SE > NI > NE$

The general results obtained can be represented graphically
as in Figure 1.

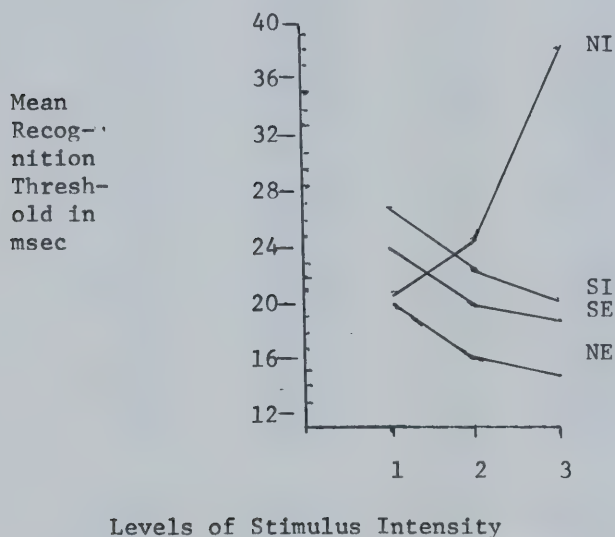


Figure I

Level 1-LA words: mean aggressivity value 2.95

Level 2-ALL words: mean aggressivity value 5.32

Level 3-HA words: mean aggressivity value 7.82
(Buss, 1961).

These results have suggested additional analysis of the data which is presented under the heading "Additional Findings".

In order to test the fifth hypothesis, the GSRs of NE and NI were combined to yield a common score for the total group of HN, and similarly, the GSRs of SE and SI were combined to obtain the appropriate scores for LN. The mean recognition GSRs for HN and LN are presented in Table 11.

Table 11

Mean recognition GSR (log conductance)
of HN and LN on the critical words

No	Mean log conductance	
	High Neurotics	Low Neurotics
1	1.023	1.034
2	1.050	1.057
3	1.030	1.083
4	1.036	1.054
5	1.029	1.071
6	1.054	1.020
7	1.039	1.038
8	1.042	1.047
9	1.051	1.090
10	1.100	1.120
11	1.029	1.047
12	1.139	1.100
13	1.025	1.069
14	1.080	1.083
15	1.039	1.033
16	1.015	1.007
17	1.051	1.055
18	1.093	1.000
19	1.034	1.158
20		1.089
Sum	19.968	21.255
Mean	1.05	1.06

A t test of significance run between the mean reactivity scores of HN and the mean reactivity scores of LN yielded a non-significant t value of 0.841 (n.s., df: 37). The slight difference between the overall means was in the opposite direction to that predicted. Hence, the fifth hypothesis, which states that HN will give higher sympathetic reactivity must be rejected, with GSR taken as an index of autonomic reactivity.

Table 12 presents the difference in GSR between NI and NE.

Table 12

Mean GSR values (log
conductance) for NI and
NE on all the critical words

No	Mean log conductance	
	NI	NE
1	1.015	1.023
2	1.051	1.050
3	1.093	1.030
4	1.034	1.036
5		1.029
6		1.054
7		1.039
8		1.042
9		1.051
10		1.100
11		1.029
12		1.139
13		1.025
14		1.080
15		1.039
Sum	4.193	15.766
n	4	15
Mean	1.04	1.05

The data presented in Table 12 failed to support the sixth hypothesis. A test of significance of the difference between the mean reactivity score of NI and NE yielded a non-significant result ($t=1.252$, n.s. df: 17). The difference was not significant and it was in the direction opposite to that predicted. NE did in fact appear more reactive than NI in the study. Hypothesis number six was therefore rejected.

Table 13 presents the difference between GSR for HA and LA words.

Table 13

Mean recognition GSR
(log conductance) of
Ss on HA and LA words

Ss	Mean log conductance		
	HA	LA	Difference
1	1.0078	1.0068	0.0010
2	1.004	1.0027	0.0013
3	1.0062	1.008	-0.0018
4	1.0038	1.003	0.0008
5	1.006	1.0054	0.0006
6	1.0058	1.0088	-0.0030
7	1.0032	1.0076	-0.0044
8	1.0098	1.00432	0.0055
9	1.00162	1.00242	-0.0008
10	1.007	1.00052	0.0065
11	1.002	1.002	0
12	1.0022	1.0024	-0.0002
13	1.009	1.00116	0.0078
14	1.0036	1.0024	0.0012
15	1.0044	1.0028	0.0016
16	1.0034	1.0024	0.0010
17	1.0048	1.006	-0.0012
18	1.0062	1.0048	0.0014
19	0.9984	1.0029	-0.0045
20	1.014	1.0176	-0.0036
21	1.0112	1.0066	0.0046
22	1.0054	1.004	0.0014
23	1.0062	1.0118	-0.0056
24	1.0105	1.0138	-0.0033
25	1.005	1.0044	0.0006
26	1.0118	1.0082	0.0036
27	1.010	1.0037	0.0063
28	1.00396	1.0062	-0.0022
29	1.0108	1.0078	0.0030
30	1.003	1.0038	-0.0008
31	1.0038	1.004	-0.0002
32	1.0036	1.0048	-0.0012
33	1.0046	1.0054	-0.0008
34	1.0088	1.00112	0.0077
35	1.0052	1.0006	0.0046
36	1.0106	1.019	-0.0084
37	0.9992	1.00502	-0.0058
38	1.0064	1.0096	-0.0032
39	1.0048	1.003	0.0018

As can be seen from Table 13, 20 Ss did give slightly higher GSR with HA words than with LA words, and 18 gave the reverse. A test of significance of the differences between the Ss' GSR on HA and Ss' GSR on LA yielded a non-significant t value ($t=0.4403$, n.s. $df: 38$). On the basis of these results, it was concluded that there was no significant difference between HA-GSR and LA-GSR, and the seventh hypothesis was therefore rejected.

Additional Findings. The GSR data were analysed to see if supporting evidence could be found with aggressive words for McGinnies' (1949) findings with sexual words. The pre-recognition GSR of Ss to HA words was compared with the pre-recognition GSR to LA words. Table 14 gives the mean pre-recognition galvanic skin responses, measured in log conductances, of all Ss on HA and LA words.

Table 14

Mean pre-recognition
GSR (log conductance)
of Ss on HA and LA words

Ss	Mean log conductance		
	HA words	LA Words	Difference
1	0	1.005	
2	1.0095	1.0095	0
3	1.0038	1.0167	-0.0069
4	1.0043	1.003	0.0013
5	0	1.016	0
6	1.010	1.0075	0.0025
7	1.007	1.00725	-0.0002
8	1.00253	1.00253	0
9	1.004	1.00267	0.0013
10	1.007	1.0073	-0.0003
11	1.002	1.005	-0.0030
12	1.001	1.000	0.0010
13	1.00312	1.0085	-0.0054
14	1.000	1.003	-0.0030
15	1.00467	1.002	0.0027
16	1.013	1.00467	0.0083
17	1.00567	1.003	0.0027
18	1.0073	1.0072	0.0001
19	0.995	1.008	-0.0085
20	1.0125	1.0093	0.0032
21	1.0125	1.0117	0.0008
22	1.0038	1.0027	0.0011
23	1.0117	1.0115	0.0002
24	1.008	1.0115	-0.0035
25	1.0113	1.005	0.0063
26	1.0088	1.009	-0.0002
27	1.0145	1.0063	0.0082
28	1.0037	0.8050	0.1987
29	1.0035	1.00875	-0.0052
30	1.0014	1.0032	-0.0018
31	0	1.0025	
32	1.00467	1.0033	0.0014
33	1.003	1.003	0
34	1.010	1.0148	-0.0048
35	1.0015	1.003	-0.0015
36	0	0	
37	1.012	1.008	0.0040
38	1.00975	0	
39	1.005	0	

An inspection of Table 14 revealed that of the thirty Ss whose readings were finally included in the analysis, only 13 gave slightly higher pre-recognition GSR to HA words. The rest either gave the reverse or showed no difference at all. In fact, the overall difference between the mean pre-recognition GSR of HA words, and that of LA words, though slightly favouring HA words was extremely small (0.00674). A test of significance of the difference between mean HA-pre-recognition GSR and LA pre-recognition GSR yielded a non-significant result ($t=0.935$, n.s., $df: 29$). This study therefore did not lend supporting evidence to McGinnies' reported GSR findings.

An additional test was carried out to determine if in general, there was any significant difference between the mean recognition thresholds for LN and HN on the aggressive words. Similar such tests were also carried out to see if in general there was a significant difference between the performance of extraverts and introverts as suggested by the graphs in Fig. 1. Table 15(a and b) gives the average mean recognition thresholds of LN and HN, and introverts (I), and extraverts (E) (summed over all levels of N).

Table 15

Mean recognition thresholds
(msec) of LN and HN, E and I, for
the three conditions of stimulation

(a) LN and HN

Condition	LN	HN	Difference	t	p
LA	25.65	20.74	4.91	1.739	0.17 > 0.5
ALL	20.175	18.82	1.355	0.734	n.s.
HA	20.00	19.47	0.53	0.1345	n.s.

(b) E and I

Condition	E	I	Difference	t	p
LA words	22.29	24.66	-2.37	0.7376	n.s.
ALL words	18.07	23.18	-5.11	2.709	0.05 < 0.01
HA words	16.50	28.00	-11.50	2.912	p < 0.01

Tests of significance on the differences between the appropriate pairs of means yielded the t values tabulated. These results indicated that Extraverts had lower recognition thresholds and this was more marked for the HA words. No significant difference was present in the LN and HN groups.

Next, the recognition thresholds for HA words and LA words were compared. The aim of this was to see if in general, HA words produced higher recognition thresholds than LA words. Positive results will tend to support the McGinnies (1949) hypothesis of perceptual defence, if extrapolation can be made from sexual to aggressive words. Table 16 represents the mean recognition thresholds obtained by each S under HA and LA conditions.

Table 16

Mean recognition thresholds (msec)
of Ss for HA and LA words

Ss	Mean recognition threshold		
	HA words	LA words	Difference
1	10	16	- 6
2	26	48	-22
3	58	30	28
4	18	20	- 2
5	10	22	-12
6	10	16	- 6
7	26	30	- 4
8	18	20	- 2
9	12	18	- 6
10	12	22	-10
11	20	22	- 2
12	15	23.3	- 8.3
13	14	18	- 4
14	22	28	- 6
15	26	22	4
16	18	26	- 8
17	12	26	-14
18	32	42	-10
19	30	28	2
20	14	22	- 8
21	10	16	- 6
22	18	28	-10
23	12	18	- 6
24	16	12	4
25	14	22	- 8
26	20	22	- 2
27	10	28	-18
28	16	20	- 4
29	12	18	- 6
30	20	40	-20
31	16	22	- 6
32	10	12	- 2
33	20	30	-10
34	20	20	0
35	10	20	-10
36	12	14	- 2
37	28	26	2
38	42	24	18
39	64	22	42

The recognition thresholds for HA words were lower than those for LA words. The difference between the HA words and LA words was tested by a correlated t test and found to be highly significant ($t = 3.984$, $p < 0.01$, $df: 38$). In 32 Ss out of 39, the threshold for HA was lower than for LA words. These results do not support the "perceptual defence" hypothesis. They do however, support a perceptual, vigilance hypothesis. The important finding seems to indicate that most Ss were actually perceiving the high aggressive words faster than the low aggressive words.

To find out if this relationship did exist in general over the total class of stimulus words used in the study, a Spearman's rank order correlation was computed between the aggressivity value of the 20 stimulus words and their recognition thresholds. Table 17 gives the words arranged with their average aggressiveness values as scaled by Buss (1961), their overall mean recognition thresholds summed over all Ss, and their ranks. A correlation coefficient of -0.233 was obtained between stimulus aggressivity values and recognition thresholds. Though not significant, at the 5% level, a negative correlation meant that, in general, there was some tendency for thresholds to decrease with increasing stimulus aggressiveness (emotionality).

Table 17

Stimulus words ranked on
intensity values and
recognition thresholds

Stimulus word	Intensity		Response threshold		Difference in rank (\bar{D})
	Mean value	Rank	Mean value	Rank	
Contest	1.65	17	24.73	3	14
Dissent	3.2	15	23.32	6	9
Contrary	3.2	15	27.89	1	14
Teasing	3.05	16	19.74	10	6
Peevish	3.4	14	22.82	7	7
Chiding	3.45	13	26.84	2	11
Nuisance	3.65	12	20.00	9	3
Reproof	3.8	11	21.79	8	3
Dislike	3.95	9	12.82	20	-11
Grouchy	3.9	10	16.66	14	-4
Kicking	6.6	8	14.61	17	-9
Slander	6.65	7	14.36	18	-11
Abusive	6.6	8	14.74	16	-8
Loathing	7.0	6	17.18	13	-7
Enraged	7.3	5	24.10	5	0
Revenge	7.2	6	12.9	19	-13
Furious	7.35	4	16.05	15	-11
Mauling	7.75	3	24.61	4	-1
Mangling	7.95	2	17.44	12	-10
Torture	8.75	1	17.94	11	-10

DISCUSSION

The results of this study indicate that all the groups, with the exception of the neurotic introvert group, had lower recognition thresholds for HA words than LA words. This relation was reversed in the neurotic introvert group. However, in view of the very small n (4) of this group, and lack of statistical significance of the found difference, this finding most likely is due to sampling error. With this exception, the findings are in agreement with Eysenck's theory so far as the latter would postulate that aggressive words have higher stimulus intensity value and therefore would be recognised at lower thresholds than non-aggressive words.

The reversal of this tendency for high neurotic introverts if it was not due to a sampling error could suggest a possibility of the existence of protective mechanisms of narrowed sensory input channels when the intensity of the stimulus becomes too high. Sensory mechanisms like that were suggested by Callaway and Thompson (1953) as a protection against too high arousal produced by excessive physical intensity of stimulus, or its meaning acquired through the subject's past experience. A stimulus can produce arousal either by its physical intensity, its novelty, or its association with past highly emotional experiences. Both aggressive and sexual words would come under the last category. When therefore, neurotic introverts, who are already in a state of high arousal, due both to an inherently high excitatory state of the cortex and to its secondary activation from the subcortical sympathetic centres (RAS), are exposed to high emotion arousing words, they respond with a reduction of sensory

input. This shows up in delayed recognition (high perceptual threshold) of the high emotion arousing words (Table 10). However, even if the difference found was not due to sampling error the validity of this argument is dubious in view of the fact that the stable extraverts had a lower perceptual threshold than the stable introverts.

Apart from the results with the neurotic introvert group, which are of dubious reliability in view of a very small n , there is no evidence in this study for the existence of a mechanism of defence as postulated by McGinnies (1949) for sexual words. Instead of a "perceptual defence", there is on the contrary, strong evidence for "perceptual vigilance". Subjects tended to recognise HA words at lower thresholds than LA words. This can be explained either in the framework of Eysenck's theory, or in a psychodynamic framework by postulating the presence of specific perceptual vigilance.

In the framework of Eysenck's theory, these results could be interpreted by postulating that aggressive words are, psychologically speaking, more intense stimuli than less aggressive words and as such have lower recognition thresholds. This may be due to the fact that because of past emotional associations the sensory cues representing these words have a high power of focusing attention of the subject resulting in a better cue utilisation than is the case with neutral words. The explanation using the above theoretical framework relies on psychophysiological concepts and eschews explanations in terms of personal psychodynamics. It is simply contended that HA words

produce higher emotional arousal and, as a result, a more efficient utilisation of the relevant cues than LA words. Hence HA words have lower thresholds than LA words.

Viewing the results in terms of the repression-sensitisation psychodynamic model, the presence of perceptual vigilance for specific stimuli can be postulated. According to this view subjects are selectively on the "look-out" for dangerous or threatening stimuli. The subjects used in the study would then be regarded as "sensitizers" (Ericksen, 1954). These individuals when confronted with emotionally threatening stimuli, would respond with vigilance and so would have lower thresholds to high aggressive stimuli than to low aggressive ones. It is believed by some authors that on the repression-sensitisation dimension, extraverts tend to be "repressives", and introverts "sensitizers" (Venables and Sayer, 1964; Ericksen, 1954). Thus if this view were correct one would expect that a majority of Ss used in the present study would be introverts. However, the majority of Ss tested were extraverted Ss (28 out of 39). Furthermore, the general tendency noticed throughout the study was for extraverts to have the low thresholds, and introverts, the high recognition thresholds. The conclusion to be reached from this study, if we were to accept the sensitization-repression explanation is that introverts are "repressives" and extraverts are "sensitizers".

Using the framework of psychophysiological theory, the relation between stimulus intensity or its specific significance (aggressiveness) and prior arousal of the organism, on the one hand, and perceptual threshold on the other hand may be explained

in relation to the found difference between HN and LN groups in the following manner: Both stimulus intensity and the existing level of prior arousal interact resulting in lowering perceptual threshold. This relation holds up to a certain point of the resulting arousal level. Beyond that point, further increase of either the stimulus intensity or the level of arousal, result in an increased perceptual threshold (Table 15a).

The findings of this study do not support Eysenck's theory (1957) regarding the difference between extraverts and introverts. Introverts, were found to have higher recognition thresholds than extraverts (Figure 1, Tables 4, 15b). The results tend to support rather McDougall's (1927) theory of extraversion and introversion which generates opposite predictions. McDougall's theory, as summarised by Ginsburg (1967) is a two-stage inhibition model. The first stage is a neural inhibition whereby some areas of the cortex restrict the activity of other cerebral areas. This first stage inhibition has no relation to personality even though it shows both a phylogenetic and an ontogenetic trend. The second stage is chemical in nature. McDougall proposed a substance which he called X. X restricts the activity of the inhibitory cells by raising their synaptic resistance. The more X that is present in the brain, the more the excitatory centres will be freed from inhibitory control. In McDougall's model, it is the extraverts who have larger amounts of X, and the introverts, less. Thus for McDougall, it is extraverts who are more sensitive to stimulation. The results, with both GSR and perceptual thresholds, tend to support this opposite prediction from McDougall's theory rather than that of Eysenck's.

However, before the results of this study can be used as evidence against Eysenck's formulation of the extraversion-introversion concept, caution is necessary in view of the recent modifications of his theory (Eysenck, 1964; 1965; 1966; 1967). According to the new formulation of Eysenck's theory, the level of performance of extraverts and introverts depends on the level of arousal in accordance with the Yerkes-Dodson Law relating drive to performance. In other words it is not possible to predict the direction of the difference in performance between extraverts and introverts without knowing the level of arousal. With this reformulation of Eysenck's theory, whether or not extraverts will have higher thresholds than introverts will depend on what side of the inverted U, postulated to relate arousal to performance, the Ss will happen to fall. The negative GSR finding could have been due to the unreliability of GSR measures which would indicate the desirability of having a greater number of physiological measures of emotional arousal or activation in future studies. Thus, the EEG and Heart Rate could be included in addition to GSR. The usefulness of an EEG measure is indicated by the fact that variations in it during perception of aggressive stimuli will permit the investigation of the hypothesis put forward to explain the behaviour of neurotic introverts. The suggested narrowing of the attentional field should be detected as a general desynchronisation pattern (disappearance of alpha rhythm -- alert EEG).

CONCLUSIONS

The two most important findings of this study are the following:

1. Subjects had lower perceptual thresholds to high aggressive words than to low aggressive words. Thus, as far as aggressive words are concerned there is evidence for perceptual vigilance rather than for perceptual defence.
2. Extraverts have lower perceptual thresholds and therefore are more sensitive to external stimuli than introverts.

The first difference was predicted by the hypothesis tested in this study. The second difference was not expected, and was in the opposite direction from the predicted. These results are of great interest and should be followed by further studies.

FOOTNOTES

1

Using the result of lengthy item analyses and factor analyses on an original sample of 200 men and 200 women, Eysenck constructed the 1959 version of the Maudsley Personality Inventory (MPI) used in this study. It is designed to measure the personality dimensions of Neuroticism and Extraversion. Each of the two traits is measured by means of 24 questions.

Reliability of the scales.

Both split-half and Kuder-Richardson reliability coefficients have been calculated. For the Neuroticism scale they lie between 0.85 and 0.90; for the Extraversion scale, they lie between 0.75 and 0.85 with the majority above 0.80. Retest reliabilities on 100 cases lie between 0.83 and 0.81. Table 18 gives the standardization groups.

Table 18

Standardization Groups

Description of Group	Size N	mean	N	E mean	E
Normals (English):Quota sample	1800	19.89	11.02	24.91	9.71
Normals (American students)	1500	20.91	10.69	28.53	8.28
Dysthymics (Hospital patients)	84	38.18	10.84	17.86	10.02
Prisoners (Recidivists)	146	30.35	10.73	24.09	9.11
Hysterics (Hospital patients)	58	30.82	11.84	24.91	9.26
Psychosomatics (Hospital patients)	108	35.69	10.89	25.38	9.33
Psychopaths' (Hospital patients)	36	35.58	10.91	30.77	9.51

Short Scale

Normals (English): Quota sample	1600	6.15	3.33	7.96	2.97
---------------------------------	------	------	------	------	------

The Correlations of the scales with other inventories; N correlates with the Heron and Cattell neuroticism scales, the Guilford C scale and the Taylor scale.

E correlates with the Heron and Cattell extraversion scales, the Guilford R scale, the Minnesota Sociability scale, and negatively with the Taylor scale (Eysenck, 1959). Differences in age, sex, and class are slight.

2

In this study:

The median scale values computed separately for each sex, were combined and an average value obtained (Table 1). Buss (1961) calls these words hostile words. Differences of the order of 1.0 and larger represent significantly different points of the intensity dimension. The list of hostile words was scaled by the method of successive intervals and has been used in a stimulus generalisation experiment with positive results (Buss, 1961).

3

The method of preparation of the site used in this study originates from Venables and Sayer (1963). Montagu (1966) however, maintains that abrasing and sand-papering does not produce minimal resistance. He obtained residual resistance of greater than 10,000 ohms (electrode diameter 2.5 cm) after following abrasing. He therefore suggests intermittent abrasing, interspersed by actual resistance measures at the site, until negligible resistance is obtained. For practical considerations, Montagu's (1965) suggestions could not be adopted in this study.

REFERENCES

- Agnew, N. and Agnew, M. Drive Level effects on tasks of narrow and broad attention. Quarterly Journal of Experimental Psychology, 1963, 15, 58-62.
- Beier, E. G., & Cowen, E. L. A further investigation of the influence of "threat-expectancy" on perception. Journal of Personality, 1953, 22, 254-257.
- Bharucha-Reid, R.P. The internal modulating system and stress: a neurophysiological model. Journal of General Psychology, 1962, 66, 147-158.
- Blum, G. S. An experimental reunion of psychoanalytic theory with perceptual vigilance and defense. Journal of Abnormal and Social Psychology, 1954, 49, 94-98.
- Blum, G. S. Perceptual defense revisited. Journal of Abnormal and Social Psychology, 1955, 51, 24-29.
- Blum, G. S. An investigation of perceptual defense in Italy. Psychological Reports, 1957, 3, 169-175.
- Bootzen, R. R., & Natsoulas, T. Evidence for perceptual defense uncontaminated by response bias. Journal of Personality and Social Psychology, 1965, 1, 461-468.
- Brown, W. P. Conceptions of perceptual defense. British Journal of Psychology, Monograph Supplement, 1961, No. 35.
- Bruner, J. S., & Postman, L. Emotional selectivity in perception and reaction. Journal of Personality, 1947, 66, 69-77.
- Byrne, D. The Repression-Sensitization scale: Rationale, reliability, and validity. Journal of Personality, 1961, 29, 334-349.
- Byrne, D. Repression-Sensitization as a dimension of personality. In B. A. Maher (Ed.), Progress in experimental personality research (vi). New York: Academic Press, 1964.
- Buss, A. H. The psychology of aggression. New York: John Wiley and Sons, Inc., 1961.
- Callaway, E., & Thompson, S. V. Sympathetic activity and perception. Psychosomatic Medicine, 1953, 15, 443-455.
- Callaway, E., & Band, R. I. Some psychopharmacological effects of atropine. Arch. Neurol. Psychiat., 1958, 79, 91-102.
- Callaway, E., & Dembo, D. Narrowed attention: a psychological phenomenon that accompanies a certain physiological change. Arch. Neurol. Psychiat., 1958, 79, 74-90.

- Chodorkoff, B., & Chodorkoff, J. Perceptual defense: An integration with other research findings. Journal of General Psychology, 1958, 58, 75-80.
- Cowen, E. L., & Beier, E. G. Threat-expectancy, word frequencies, and perceptual prerecognition hypothesis. Journal of Abnormal and Social Psychology, 1954, 49, 178-182.
- Cowen, E. L., & Obrist, P. A. Perceptual reactivity to threat and neutral words under varying experimental conditions. Journal of Abnormal and Social Psychology, 1958, 56, 305-310.
- Daston, P. G. Perception of idiosyncratically familiar words. Perceptual Motor Skills, 1956, 7, 3-6.
- Davis, J. M. Personality, perceptual defense, and stereoscopic perception. Journal of Abnormal and Social Psychology, 1959, 58, 398-402.
- DeLucia, J. J., & Stagner, R. Emotional vs. frequency factors in word-recognition time and association time. Journal of Personality, 1953, 22, 299-309.
- Diers, W. C. A study of the effectiveness of verbalization in the homeostatic recovery from displacement induced by verbal-aggressive stimuli. Unpublished doctor's dissertation, University of Cincinnati, 1955.
- Ellsworth, R. B. The effects of hostility on related verbal problem-solving behaviour. Unpublished doctoral dissertation, Pennsylvania State University, 1953.
- Ericksen, C. W. Perceptual defense as a function of unacceptable needs. Journal of Abnormal and Social Psychology, 1951, 46, 557-564.
- Ericksen, C. W. Individual differences in defensive forgetting. Journal of Experimental Psychology, 1952, 44, 442-446.
- Ericksen, C. W. The case for perceptual defence. Psychological Review, 1954, 61, 175-182.
- Ericksen, C. W. Psychological defenses and "ego-strength" in the recall of completed and incompleting tasks. Journal of Abnormal and Social Psychology, 1954, 49, 45-50.
- Ericksen, C. W., & Lazarus, R. S. Perceptual defense and projective tests. Journal of Abnormal and Social Psychology, 1952, 47, 302-308.
- Ericksen, C. W., & Browne, C. T. An experimental and theoretical analysis of perceptual defense. Journal of Abnormal and Social Psychology, 1956, 52, 224-230.

- Eysenck, H. J. Dimensions of personality. London: Kegan Paul, 1947.
- Eysenck, H. J. The dynamics of anxiety and hysteria. London: Routledge & Kegan Paul, 1957.
- Eysenck, H. J. Manual of the Maudsley Personality Inventory. London: University of London Press, 1959.
- Eysenck, H. J. (Ed.). Handbook of abnormal psychology. New York: Basic Books, 1961.
- Eysenck, H. J. (Ed.). Experiments in motivation. New York: The MacMillan Company, 1964.
- Eysenck, H. J. The causes and cures of neurosis. London: Routledge & Kegan Paul, 1965.
- Eysenck, H. J. On the dual function of consolidation. Perceptual and motor skills, 1966, 22, 273-274.
- Eysenck, H. J. The biological basis of personality. Springfield: Charles C. Thomas, 1967.
- Ginsburg, N. Adaptation to intermittent light and extraversion. Unpublished paper circulated by author, 1967.
- Goldiamond, I. Indicators of perception: I. Subliminal perception, subception, unconscious perception: An analysis in terms of Psychophysical indicator methodology. Psychological Bulletin, 1958, 55, 373-411.
- Goldiamond, I. Word frequency, accuracy of recognition, and conditioning: or just what role does a discriminative stimulus play in a recognition experiment. Paper presented at symposium: word frequency as a variable in behavioural studies. American Psychological Association, Chicago, September, 1960.
- Goldin, P. Repression and ego-defense: The effect of failure-stress on perceptual accuracy and self-concept. Unpublished doctoral dissertation, University of North Carolina, 1962.
- Goldstein, M. J. A test of the response probability theory of perceptual defense. Journal of Experimental Psychology, 1962, 63, 23-28.
- Greenbaum, M. Manifest anxiety and tachistoscopic recognition of facial photographs. Perceptual Motor Skills, 1956, 6, 245-248.
- Howes, D., & Solomon, R. L. A note on McGinnies' "Emotionality and perceptual defense". Psychological Review, 1950, 57, 229-234.
- Howes, D., & Solomon, R. L. Visual duration threshold as a function of word probability. Journal of Experimental Psychology, 1951, 41, 401-410.

- Kleinman, M. L. Psychogenic deafness and perceptual defence. Journal of Abnormal and Social Psychology, 1957, 54, 335-338.
- Lacey, O. W., Lewinger, N., & Adamson, J. F. Foreknowledge as a factor affecting perceptual defense and alertness. Journal of Experimental Psychology, 1953, 45, 169-174.
- Lader, M. H. Effect of cyclobarbitone on the habituation of autonomic responses. Unpublished doctoral dissertation, University of London, 1963.
- Levy, L. H. Perceptual defense in tactual perception. Journal of Personality, 1958, 26, 467-478.
- Lykken, D. T. Properties of electrodes used in electrodermal measurement. Journal of Comparative and Physiological Psychology, 1959, 52, 629-634.
- Malmö, R. B. Activation: a neuropsychological dimension. Psychological Review, 1959, 66, 367-386.
- Mathews, Ann, & Wertheimer, M. A "pure" measure of perceptual defense uncontaminated by response suppression. Journal of Abnormal and Social Psychology, 1958, 57, 373-376.
- Mattson, J. M., & Natsoulas, T. Emotional arousal and stimulus duration as determinants of stimulus selection. Journal of Abnormal and Social Psychology, 1962, 57, 142-144.
- McDougall, W. The chemical theory of temperament applied to introversion and extraversion. Journal of Abnormal and Social Psychology, 1927, 24, 293-309.
- McGinnies, E. Emotionality and perceptual defense. Psychological Review, 1949, 56, 244-251.
- McGinnies, E. Discussion of Howes' and Solomon's note on "Emotionality and perceptual defense". Psychological Review, 1950, 57, 235-240.
- McGinnies, E., & Sherman, H. Generalization of perceptual defense. Journal of Abnormal and Social Psychology, 1952, 47, 81-85.
- Minard, J. G. The measurement and conditioning of "perceptual defense" and response suppression. Unpublished doctoral dissertation, University of Colorado, 1963.
- Minard, J. G. Response bias interpretation of perceptual defense. Psychological Review, 1965, 72, 74-88.
- Montagu, J. D., & Coles, E. M. Mechanisms and measurement of the galvanic skin response. Psychological Bulletin, May 1966, 261-279.

- Nothman, F. H. The influence of response conditions on recognition thresholds for tabu words. Journal of Abnormal and Social Psychology, 1962, 65, 154-161.
- Nelson, S. E. Psychosexual conflicts and defenses in visual perception. Journal of Abnormal and Social Psychology, 1955, 51, 427-433.
- Postman, L., Bronson, W. C., & Gropper, G. L. Is there a mechanism of perceptual defense? Journal of Abnormal and Social Psychology, 1953, 48, 215-224.
- Postman, L., and Brown, D. R. The perceptual consequences of success and failure. Journal of Abnormal and Social Psychology, 1953, 47, 213-221.
- Scott, T. R. Social reinforcement of aggressive sentences. Unpublished doctor's dissertation, University of Nebraska, 1958.
- Sines, J. O. Conflict related stimuli as elicitors of selected physiological responses. Journal of Projective Techniques, 1957, 21, 194-198.
- Thorndike, E. L., & Lorge, I. The teacher's word book of 30,000 words. New York: Columbia University Press, 1944.
- Venables, P. H., & Sayer, E. On the measurement of the level of skin potential. British Journal of Psychology, 1963, 54, 251-260.
- Zajonc, R. B. Response suppression in perceptual defense. Journal of Experimental Psychology, 1962, 64, 206-214.

APPENDIX A

The Maudsley Personality

Inventory

Name _____ Christian Names _____

Age _____ Sex _____ Occupation _____

N =

E =

? =

Instructions:

Here are some questions regarding the way you behave, feel and act. After each question there is a "Yes" a "?" and a "No".

Try and decide whether "yes" or "no" represents your usual way of acting or feeling; then put a circle around the "yes" or "no". If you find it impossible to decide, put a circle around the "?", but do not use this answer except very occasionally. Work quickly, and don't spend too much time over any question; we want your first reaction, not a long drawn-out thought process! The whole questionnaire shouldn't take more than a few minutes. Be sure not to omit any questions. Now go ahead, work quickly, and remember to answer every question. There are no right or wrong answers, and this isn't a test of intelligence or ability, but simply a measure of the way you behave.

- | | | | |
|---|-----|---|----|
| 1. Are you the happiest when you get involved in some project that calls for rapid action? | Yes | ? | No |
| 2. Do you sometimes feel happy, sometimes depressed, without any apparent reason? | Yes | ? | No |
| 3. Does your mind often wander while you are trying to concentrate? | Yes | ? | No |
| 4. Do you usually take the initiative in making new friends? | Yes | ? | No |
| 5. Are you inclined to be quick and sure in your actions? | Yes | ? | No |
| 6. Are you frequently "lost in thought" even when supposed to be taking part in a conversation? | Yes | ? | No |
| 7. Are you sometimes bubbling over with energy and sometimes very sluggish? | Yes | ? | No |
| 8. Would you rate yourself as a lively individual? | Yes | ? | No |
| 9. Would you be very unhappy if you were prevented from making numerous social contacts? | Yes | ? | No |
| 10. Are you inclined to be moody? | Yes | ? | No |
| 11. Do you have frequent ups and downs in mood, either with or without apparent cause? | Yes | ? | No |

12.	Do you prefer action to planning for action?	Yes	?	No
13.	Are your daydreams frequently about things that can never come true?	Yes	?	No
14.	Are you inclined to keep in the background on social occasions?	Yes	?	No
15.	Are you inclined to ponder over your past?	Yes	?	No
16.	Is it difficult to "lose yourself" even at a lively party?	Yes	?	No
17.	Do you ever feel "just miserable" for no good reason at all?	Yes	?	No
18.	Are you inclined to be overconscientious?	Yes	?	No
19.	Do you often find that you have made up your mind too late?	Yes	?	No
20.	Do you like to mix socially with people?	Yes	?	No
21.	Have you often lost sleep over your worries?	Yes	?	No
22.	Are you inclined to limit your acquaintances to a select few?	Yes	?	No
23.	Are you often troubled about feelings of guilt?	Yes	?	No
24.	Do you ever take your work as if it were a matter of life or death?	Yes	?	No
25.	Are your feelings rather easily hurt?	Yes	?	No
26.	Do you like to have many social engagements?	Yes	?	No
27.	Would you rate yourself as a tense or "highly-strung" individual?	Yes	?	No
28.	Do you generally prefer to take the lead in group activities?	Yes	?	No
29.	Do you often experience periods of loneliness?	Yes	?	No
30.	Are you inclined to be shy in the presence of the opposite sex?	Yes	?	No
31.	Do you like to indulge in a reverie (daydreaming)?	Yes	?	No
32.	Do you nearly always have a "ready answer" for remarks directed at you?	Yes	?	No
33.	Do you spend much time in thinking over good times you have had in the past?	Yes	?	No
34.	Would you rate yourself as a happy-go-lucky individual?	Yes	?	No
35.	Have you often felt listless and tired for no good reason?	Yes	?	No
36.	Are you inclined to keep quiet when out in a social group?	Yes	?	No
37.	After a critical moment is over, do you usually think of something you should have done but failed to do?	Yes	?	No

- | | | | | |
|-----|---|-----|---|----|
| 38. | Can you usually let yourself go and have an hilariously good time at a gay party? | Yes | ? | No |
| 39. | Do ideas run through your head so that you cannot sleep? | Yes | ? | No |
| 40. | Do you like work that requires considerable attention? | Yes | ? | No |
| 41. | Have you ever been bothered by having a useless thought come into your mind repeatedly? | Yes | ? | No |
| 42. | Are you inclined to take your work casually, that is as a matter of course? | Yes | ? | No |
| 43. | Are you touchy on various subjects? | Yes | ? | No |
| 44. | Do other people regard you as a lively individual? | Yes | ? | No |
| 45. | Do you often feel disgruntled? | Yes | ? | No |
| 46. | Would you rate yourself as a talkative individual? | Yes | ? | No |
| 47. | Do you have periods of such great restlessness that you cannot sit long in a chair? | Yes | ? | No |
| 48. | Do you like to play pranks on others? | Yes | ? | No |

APPENDIX B

Data sheets used in scoring GSR,
and a specific example

EXPERIMENT _____

DATE _____

SUBJECT _____

SEX _____

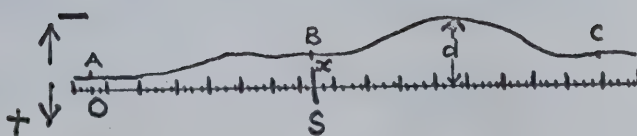
DIAGNOSTIC CATEGORY _____

STIMULUS _____

VALUE _____

TRIAL	PRE-RECOGNITION RESPONSE			
	Reading at Presentation of Stimulus	Reading at Maximum Deflection	Trial max Reading	Trial converted GSR
Sum of trial Readings _____				
Number trials _____				
Stimulus pre-recognition GSR _____				
RECOGNITION RESPONSE				
Reading at stimulus recognition _____				
Maximum Deflection at recognition _____				
Recognition Reading _____				
Stimulus recognition GSR _____				

Fig. 2



Let Figure 2 represent a part of polygraphic tracing

Specific Example

In figure 2, Level A is the zero, i.e. level of resistance after 4 minutes GSR stabilisation prior to stimulus presentation. Let this be 29,400 ohms. S marks the time of stimulus presentation. The distance BC on the tracing covers 10 seconds.

d= maximum deflection in mm (4mm).

x= distance in mm (2mm).

y= distance AO in mm (1mm).

The response, in mm, to stimulus word S is (d-x) mm i.e. (4-2) mm = 2mm.

The reading at stimulus presentation is (x-y) mm i.e. (2-1) mm = 1 mm.

Since 1 mm=200 ohms (by calibration), resistance at B is (29,400-200) ohms = 29,200 ohms, and resistance at maximum deflection is (29,200-400) ohms, which is equal to 28,800 ohms.

GSR at stimulus presentation is $\frac{1}{29,200}$ ohms

GSR at recognition of stimulus word is $\frac{1}{28,800}$ ohms

Change in log conductance is given by $(1/28,800)/(1/29,200) = 1.0014$.

B30116